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DATA EVALUATION RECORD VEGETATIVE VIGOR EC₂₅ TEST SEEDLING EMERGENCE EC₂₅ TEST §123-1 (TIER II)

1. **CHEMICAL:** Isoxaflutole **PC Code No.:** 123000

2. **TEST MATERIAL:** RPA 201772 (parent compound) **Purity:** Not reported

3. **CITATION:**

Author: Teixeira, D.

Title: Supplemental Report to RPA 201772- Determination of Effects on Seed Germination, Seedling Emergence, and Vegetative Vigor of Ten Plant Species

Study Completion Date: September 14, 2001

Laboratory: Springborn Laboratories, Inc.
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Laboratory Report ID/Study ID: 94-4-5234/10566.0194.6326.610

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Signature: **Date:** 8/28/02

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5. **APPROVED BY:** Mike Davy, OPP/EFED/ERB II

Signature: **Date:**

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Contractor Drafts*



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6. STUDY PARAMETERS:

Scientific Name of Test Organism: Scientific names not reported.
Seedling germination: tomato
Seedling emergence: cabbage, oat, perennial ryegrass, soybean, and turnip
Vegetative vigor: cabbage, cucumber, lettuce, soybean, and turnip

Definitive Study Duration: Seedling germination: 7 days
Seedling emergence: 14 days
Vegetative vigor: 14 days

Type of Concentrations: Measured

7. CONCLUSIONS:

This report contained excerpted raw data and served as a supplement to the amended final report entitled: RPA 201772-Determination of Effects on Seed Germination, Seedling Emergence and Vegetative Vigor of Ten Plant Species" (SLI Report No. 94-4-5234 dated 10 April 1996).

Seedling germination: Percent seedling germination and radicle elongation data were provided for tomato seeds exposed to a negative control, solvent control, and measured 0.63 mg/L (0.20 lb a.i./A) treatment group. Neither endpoint was significantly affected by treatment when compared to the pooled control; however, it was reported that the test was to be repeated due to <70% pooled control germination. No further information was provided.

Seedling emergence: Seedling emergence and shoot length data were provided for cabbage, soybean, and turnip. Data were also included for oat and perennial ryegrass, but it was reported that testing was inadvertently terminated on day 13, and that testing for these species was to be repeated and data were not to be reported. Measured test concentrations were 0.0060 (0.0010), 0.0115 (0.0020), 0.02211 (0.0038), 0.0398 (0.0068), 0.0714 (0.012), and 0.1357 (0.023) mg a.i./L (lb a.i./A) for cabbage, 0.0714 (0.012), 0.1357 (0.023), 0.2654 (0.045), 0.5385 (0.092), and 1.089 (0.19) mg a.i./L (lb a.i./A) for soybean, and 0.0060 (0.0010), 0.0115 (0.0020), 0.0221 (0.0038), 0.0398 (0.0068), 0.0714 (0.012), and 0.1357 (0.023) mg a.i./L (lb a.i./A) for turnip. Cabbage and turnip were the most sensitive species based on shoot length. The EC₂₅ was <0.0010 lb a.i./A. The NOEC could not be determined (<0.0010) for cabbage because significant reductions (>25%) were detected at all treatment levels; the NOEC for turnip was 0.0068 lb a.i./A.

Vegetative Vigor:

Shoot length, shoot weight, and root weight data was provided for cabbage, cucumber, lettuce, onion, soybean, and turnip. Measured test concentrations were 0.025 (0.00021), 0.056 (0.00048), 0.100 (0.00086), 0.206 (0.0018), 0.413 (0.0035), and 0.749 (0.0064) mg a.i./L (lb a.i./A) for cabbage and onion, 0.749 (0.0064), 0.976 (0.0084), 2.223 (0.019), 4.480 (0.038), 9.168 (0.079), and 18.230 (0.0035) mg a.i./L (lb a.i./A) for cucumber and soybean, 0.025 (0.00021), 0.056 (0.00048), 0.100 (0.00086), 0.206 (0.0018), and 0.413 (0.0035) mg a.i./L (lb a.i./A) for lettuce, and 0.056 (0.0048), 0.164 (0.0014), 0.564 (0.0048), 1.457 (0.012), 5.845 (0.050), and 18.230 (0.16) mg a.i./L (lb a.i./A) for turnip.

Cabbage and lettuce were the most sensitive species (dicots), based on shoot and root weight. The EC₂₅ for these species was <0.00021 lb a.i./A. With the exception of cabbage root weight, a NOEC could not be determined (<0.00021 lb a.i./A) for these species and endpoints because significant reductions (>25%) were shown for both species and endpoints; the NOEC for cabbage root weight was 0.00021 lb a.i./A.

Seedling Germination

Most sensitive monocot: N/A

Most sensitive dicot: None

Seedling Emergence

Most sensitive monocot: N/A

Most sensitive dicot: **Cabbage and Turnip**

Most sensitive parameter: Shoot length

NOEC: <0.0010 lb a.i./A (cabbage); 0.0068 lb a.i./A (turnip)

LOEC: 0.0010 lb a.i./A (cabbage); 0.012 (turnip)

EC₂₅: <0.0010 lb a.i./A (cabbage and turnip) 95% CI: N/A

Probit slope: N/A

Vegetative Vigor

Most sensitive monocot: Onion (only monocot)

Most sensitive parameter: None

NOEC: 0.0064 lb a.i./A LOEC: >0.0064 lb a.i./A

EC₂₅: >0.0064 lb a.i./A 95% CI: N/A

Probit slope: N/A

Most sensitive dicot: Cabbage and Lettuce
Most sensitive parameter: Shoot and root weight
NOEC: <0.00021 lb a.i./A **LOEC: 0.00021 lb a.i./A**
EC₂₅: <0.00021 lb a.i./A **95% CI: N/A**
Probit slope: N/A

8. ADEQUACY OF THE STUDY:

A. Classification: Supplemental

B Rationale: Only excerpted raw data were reported in this MRID. There was no explanation of experimental design.

C. Repairability: These data should be reviewed together with data from the final report entitled: "RPA 201772-Determination of Effects on Seed Germination, Seedling Emergence and Vegetative Vigor of Ten Plant Species" (SLI Report No. 94-4-5234 dated 10 April 1996).

9. GUIDELINE DEVIATIONS: N/A. The submission of this report was to provide supplemental data; a definitive study was not described.

10. SUBMISSION PURPOSE: This MRID was submitted as a supplement to the amended final report entitled: "RPA 201772-Determination of Effects on Seed Germination, Seedling Emergence and Vegetative Vigor of Ten Plant Species" (SLI Report No. 94-4-5234 dated 10 April 1996).

11. MATERIALS AND METHODS:**A. Test Organisms**

Guideline Criteria	Reported Information
Species: 6 dicots in 4 families, including soybean and a rootcrop; 4 monocots in 2 families, including corn.	Dicots: <u>Seedling germination</u> : tomato <u>Seedling emergence</u> : cabbage, soybean, turnip <u>Vegetative Vigor</u> : cabbage, cucumber, lettuce, soybean, and turnip Monocots: <u>Seedling germination</u> : None <u>Seedling emergence</u> : oat, perennial ryegrass (data not appropriate to report) <u>Vegetative Vigor</u> : onion
Number of plants per repetition:	<u>Seedling germination</u> : 20 seeds/replicate <u>Seedling emergence</u> : 10 seeds/replicate <u>Vegetative Vigor</u> : 5 seedlings/replicate
Source of seed and historical % germination of seed:	Not reported.

B. Test System

Guideline Criteria	Reported Information
Solvent:	Not reported.
Site of test:	Not reported.
Planting method/type of pot:	Not reported.
Method of application:	Not reported.
Method of watering:	Not reported.
Growth stage at application:	Not reported.

C. Test Design

Guideline Criteria	Reported Information
Dose range: 2x or 3x	2x
Doses: At least 5	<p><u>Seedling germination:</u> <u>tomato</u>: 0.63 mg/L (0.20 lb a.i./A)</p> <p><u>Seedling emergence:</u> <u>cabbage</u>: 0.0060 (0.0010), 0.0115 (0.0020), 0.02211 (0.0038), 0.0398 (0.0068), 0.0714 (0.012), and 0.1357 (0.023) mg a.i./L (lb a.i./A) <u>soybean</u>: 0.0714 (0.012), 0.1357 (0.023), 0.2654 (0.045), 0.5385 (0.092), and 1.089 (0.19) mg a.i./L (lb a.i./A) <u>turnip</u>: 0.0060 (0.0010), 0.0115 (0.0020), 0.0221 (0.0038), 0.0398 (0.0068), 0.0714 (0.012), and 0.1357 (0.023) mg a.i./L (lb a.i./A)</p> <p><u>Vegetative vigor:</u> <u>cabbage and onion</u>: 0.025 (0.00021), 0.056 (0.00048), 0.100 (0.00086), 0.206 (0.0018), 0.413 (0.0035), and 0.749 (0.0064) mg a.i./L (lb a.i./A) <u>cucumber and soybean</u>: 0.749 (0.0064), 0.976 (0.0084), 2.223 (0.019), 4.480 (0.038), 9.168 (0.079), and 18.230 (0.0035) mg a.i./L (lb a.i./A) <u>lettuce</u>: 0.025 (0.00021), 0.056 (0.00048), 0.100 (0.00086), 0.206 (0.0018), and 0.413 (0.0035) mg a.i./L (lb a.i./A) <u>turnip</u>: 0.056 (0.0048), 0.164 (0.0014), 0.564 (0.0048), 1.457 (0.012), 5.845 (0.050), and 18.230 (0.16) mg a.i./L (lb a.i./A)</p>
Controls: Negative and solvent	Negative and solvent control.

Guideline Criteria	Reported Information
Replicates per dose: At least 3	3 replicates per dose
Test duration: 14 days	<u>Seedling germination</u> : 7 days <u>Seedling emergence</u> : 14 days <u>Vegetative vigor</u> : 14 days
Were observations made at least weekly?	Weekly observations
Maximum dosage rate:	Not reported.

12. REPORTED RESULTS:

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	Yes
Was a NOEC observed for each species?	No, a NOEC could not be determined for cabbage and soybean shoot length (seedling emergence), cabbage shoot weight, cucumber shoot weight and root weight, lettuce shoot weight, soybean shoot length and shoot weight, and turnip shoot length, shoot and root weight because significant reductions (>25%) were detected at all treatment levels, compared to the pooled control.
Phytotoxic observations:	<u>Seedling germination</u> : percent germination and radicle elongation <u>Seedling emergence</u> : percent emerged, emergent shoot length <u>Vegetative vigor</u> : shoot length, shoot weight, and root weight.
Were initial chemical concentrations measured? (Optional)	<u>Seedling germination</u> : Yes <u>Seedling emergence</u> : Yes, except for oat and ryegrass

Guideline Criteria	Reported Information
	<u>Vegetative vigor:</u> Yes
Were adequate raw data included?	Yes

Results for the most sensitive parameter of each species**Results Synopsis****Seedling germination****Morphological Observations**

Tomato: The mean % germination was 75.0, 46.7, and 36.7% in the negative control, solvent control, and 0.63 mg/L treatment group, respectively. The mean radicle lengths were 15.5, 10.4, and 9.8 mm in the negative control, solvent control, and 0.63 mg/L treatment group, respectively.

Seedling emergence**Morphological Observations**

Cabbage: The pooled control mean percent emergence was 85%. The percent emergence was 90.0, 90.0, 80.0, 100.0, 100.0, and 83.3% for the 0.0060, 0.0115, 0.02211, 0.0398, 0.0714, and 0.1357 mg a.i./L treatment groups, respectively.

Mean shoot lengths decreased with increasing test concentrations, compared to the pooled control mean of 6.0 cm. The mean shoot lengths were 4.9, 2.8, 2.2, 2.1, 1.9, and 1.4 cm for the 0.0060, 0.0115, 0.02211, 0.0398, 0.0714, and 0.1357 mg a.i./L treatment groups, respectively.

There were 7 mortalities in the negative control and 2 mortalities in the solvent control. There were 3, 3, 6, 1, 10 and 14 mortalities in the 0.0060, 0.0115, 0.02211, 0.0398, 0.0714, and 0.1357 mg a.i./L treatment groups, respectively.

Soybean: The pooled control mean percent emergence was 100.0%. The percent emergence was 100.0, 96.7, 100.0, 100.0, and 100.0% for the 0.0714, 0.1357, 0.2654, 0.5385, and 1.089 mg a.i./L treatment groups, respectively.

Mean shoot lengths decreased with increasing test concentrations, compared to the pooled control mean of 39.9 cm. The mean shoot lengths were 30.5, 27.8, 21.7, 16.7, and 13.0 cm for the 0.0714, 0.1357, 0.2654, 0.5385, and 1.089 mg a.i./L treatment groups, respectively.

There was one mortality 0.1357 mg a.i./L treatment group. No other mortalities were observed.

Turnip: The pooled control mean percent emergence was 93.3%. The percent emergence was 96.7, 93.3, 83.3, 86.7, 93.3, and 83.3% for the 0.0060, 0.0115, 0.0221, 0.0398, 0.0714, and 0.1357 mg a.i./L treatment groups, respectively.

Mean shoot lengths decreased with increasing test concentrations, compared to the pooled control mean of 10.8 cm. The mean shoot lengths were 6.6, 2.8, 2.7, 2.3, and 2.3 cm for the 0.0060, 0.0115, 0.0221, 0.0398, and 0.0714 mg a.i./L treatment groups, respectively. The shoot length for the 0.1357 mg a.i./L treatment group was not reported.

There were 2 mortalities in the negative control and 2 mortalities in the solvent control. There were 1, 5, 9, 8, 13, and 15 mortalities in the 0.0060, 0.0115, 0.0221, 0.0398, 0.0714, and 0.1357 mg a.i./L treatment groups, respectively.

Vegetative vigor

Morphological Observations

Cabbage: Mean shoot lengths decreased with increasing test concentrations, compared to the pooled control mean of 6.2 cm. The mean shoot lengths were 5.9, 6.1, 4.4, 4.2, 3.6, and 3.7 cm for the 0.025, 0.056, 0.100, 0.206, 0.413, and 0.749 mg a.i./L treatment groups, respectively.

Mean shoot weights decreased with increasing test concentrations, compared to the pooled control mean of 0.2518 g. The mean shoot weights were 0.1569, 0.1149, 0.1918, 0.0425, 0.0800, and 0.0504 g for the 0.025, 0.056, 0.100, 0.206, 0.413, and 0.749 mg a.i./L treatment groups, respectively. Mean root weights decreased with increasing test concentrations, compared to the pooled control mean of 0.3045 g. The mean root weights were 0.2154, 0.1882, 0.1431, 0.1058, 0.0764, and 0.0715 g for the 0.025, 0.056, 0.100, 0.206, 0.413, and 0.749 mg a.i./L treatment groups, respectively.

There were 2 mortalities in the solvent control and 1 mortality in the 0.413 mg a.i./L treatment group. No other mortalities were observed.

Cucumber: Mean shoot lengths decreased with increasing test concentrations, compared

to the pooled control mean of 25.9 cm. The mean shoot lengths were 23.9, 23.2, 24.4, 21.2, 16.6, and 15.3 cm for the 0.749, 0.976, 2.223, 4.480, 9.168, and 18.230 mg a.i./L treatment groups, respectively.

Mean shoot weights decreased with increasing test concentrations, compared to the pooled control mean of 0.5602 g. The mean shoot weights were 0.4021, 0.3443, 0.3648, 0.2691, 0.2410, and 0.2144 g for the 0.749, 0.976, 2.223, 4.480, 9.168, and 18.230 mg a.i./L treatment groups, respectively. Mean root weights decreased with increasing test concentrations, compared to the pooled control mean of 0.5613 g. The mean root weights were 0.3220, 0.2588, 0.1958, 0.3692, 0.1512, and 0.1499 g for the 0.749, 0.976, 2.223, 4.480, 9.168, and 18.230 mg a.i./L treatment groups, respectively.

There was 1 mortality in the 9.168 mg a.i./L treatment group. No other mortalities were observed.

Lettuce: Mean shoot lengths decreased with increasing test concentrations, compared to the pooled control mean of 18.3 cm. The mean shoot lengths were 15.7, 13.3, 8.6, 6.9, and 5.7 cm for the 0.025, 0.056, 0.100, 0.206, and 0.413 mg a.i./L treatment groups, respectively.

Mean shoot weights decreased with increasing test concentrations, compared to the pooled control mean of 0.2345 g. The mean shoot weights were 0.0759, 0.0605, 0.0259, 0.0259, and 0.0201g for the 0.025, 0.056, 0.100, 0.206, and 0.413 mg a.i./L treatment groups, respectively. Mean root weights decreased with increasing test concentrations, compared to the pooled control mean of 0.1760 g. The mean root weights were 0.0801, 0.0744, 0.0183, 0.0239, and 0.0264 g for the 0.025, 0.056, 0.100, 0.206, and 0.413 mg a.i./L treatment groups, respectively.

There were 2 mortalities in the 0.413 mg a.i./L treatment group. No other mortalities were observed.

Onion: Mean shoot lengths decreased with increasing test concentrations, compared to the pooled control mean of 18.1 cm. The mean shoot lengths were 17.6, 19.4, 19.2, 17.9, 17.6, and 17.0 cm for the 0.025, 0.056, 0.100, 0.206, 0.413, and 0.749 mg a.i./L treatment groups, respectively.

Mean shoot weights decreased with increasing test concentrations, compared to the pooled control mean of 0.0245 g. The mean shoot weights were 0.0234, 0.0282, 0.0240, 0.0198, 0.0214, and 0.0205 g for the 0.025, 0.056, 0.100, 0.206, 0.413, and 0.749 mg a.i./L treatment groups, respectively. Mean root weights decreased with increasing test concentrations, compared to the pooled control mean of 0.0204 g. The mean root weights were 0.0123, 0.0187, 0.0150, 0.0156, 0.0131, and 0.0153 g for the 0.025, 0.056, 0.100,

0.206, 0.413, and 0.749 mg a.i./L treatment groups, respectively.

There were 2 mortalities in the 0.025 mg a.i./L treatment group. No other mortalities were observed.

Soybean: Mean shoot lengths decreased with increasing test concentrations, compared to the pooled control mean of 81.2 cm. The mean shoot lengths were 65.4, 63.3, 55.8, 52.7, 50.9, and 45.2 cm for the 0.749, 0.976, 2.223, 4.480, 9.168, and 18.230 mg a.i./L treatment groups, respectively.

Mean shoot weights decreased with increasing test concentrations, compared to the pooled control mean of 0.7536 g. The mean shoot weights were 0.4220, 0.4315, 0.3806, 0.2940, 0.3028, and 0.2832 g for the 0.749, 0.976, 2.223, 4.480, 9.168, and 18.230 mg a.i./L treatment groups, respectively. Mean root weights decreased with increasing test concentrations, compared to the pooled control mean of 0.4441 g. The mean root weights were 0.3273, 0.3462, 0.2767, 0.2554, 0.2491, and 0.2634 g for the 0.749, 0.976, 2.223, 4.480, 9.168, and 18.230 mg a.i./L treatment groups, respectively.

There were no mortalities observed.

Turnip: Mean shoot lengths decreased with increasing test concentrations, compared to the pooled control mean of 18.3 cm. The mean shoot lengths were 15.8, 15.0, 8.6, 7.4, 6.0, and 7.5 cm for the 0.056, 0.164, 0.564, 1.457, 5.845, and 18.230 mg a.i./L treatment groups, respectively.

Mean shoot weights decreased with increasing test concentrations, compared to the pooled control mean of 0.3523 g. The mean shoot weights were 0.2513, 0.1447, 0.0553, 0.0384, 0.0345, and 0.0326 g for the 0.056, 0.164, 0.564, 1.457, 5.845, and 18.230 mg a.i./L treatment groups, respectively. Mean root weights decreased with increasing test concentrations, compared to the pooled control mean of 0.5760 g. The mean root weights were 0.2629, 0.2061, 0.0338, 0.0113, 0.0143, and 0.0091 g for the 0.056, 0.164, 0.564, 1.457, 5.845, and 18.230 mg a.i./L treatment groups, respectively.

There were 1, 10, 13, and 13 mortalities in the 0.564, 1.457, 5.845, and 18.230 mg a.i./L treatment groups, respectively. No other mortalities were observed.

Statistical Results

Statistical Method: The NOEC and EC₂₅ were not calculated. The water and solvent controls were pooled for comparisons to treatment groups.

13. REVIEWER'S VERIFICATION OF STATISTICAL RESULTS:

Statistical Method: The reviewer estimated NOEC, LOEC, and EC₂₅ values for all species and endpoints. Data for tomato germination and radicle elongation were analyzed using a Student's t-test; the treatment group was compared to the pooled control. Data for seedling emergence and vegetative vigor tests were analyzed to determine if they were normally distributed and if the variances were homogeneous. If data satisfied these assumptions, the NOEC and LOEC were determined using ANOVA followed by either Bonferroni's t-test (for non-dose-dependent responses) or William's test (for dose-dependent responses). If data did not satisfy these assumptions, the NOEC and LOEC values were determined using the Kruskall-Wallis test followed by Dunn's multiple comparison. For all analyses, treatment groups were compared to the pooled control and tests were conducted using TOXSTAT statistical software. The EC₂₅ values were estimated using the probit method via Nuthatch statistical software.

Results synopsis

Seed Germination

Species	Percent germination		Radicle elongation		Most Sensitive Parameter
	NOEC*	EC ₂₅ *	NOEC*	EC ₂₅ *	
Tomato	0.20	>0.20	0.20	>0.20	None

*units in lb a.i./A

Seedling Emergence

Species	Percent emergence		Shoot length		Most Sensitive Parameter
	NOEC*	EC ₂₅ *	NOEC*	EC ₂₅ *	
Cabbage	0.023	>0.023	<0.0010	<0.0010	Shoot length
Soybean	0.19	>0.19	<0.012	0.013	Shoot length
Turnip	0.023	>0.023	0.0068	<0.0010	Shoot length

*units in lb a.i./A

Vegetative Vigor

Species	Shoot length		Shoot weight		Root weight		Most Sensitive Parameter
	NOEC*	EC ₂₅ *	NOEC*	EC ₂₅ *	NOEC*	EC ₂₅ *	
Cabbage	0.00048	0.0013	<0.00021	<0.00021	0.00021	<0.00021	Shoot length
Cucumber	0.019	0.057	<0.0064	<0.0064	<0.0064	<0.0064	Shoot weight & root weight
Lettuce	0.00086	0.00030	<0.00021	<0.00021	0.00021	<0.00021	Shoot weight & root weight
Onion	0.0064	>0.0064	0.0064	>0.0064	0.0064	>0.0064	None
Soybean	<0.0064	0.011	<0.0064	<0.0064	0.0084	<0.0064	Shoot weight & root weight
Turnip	<0.00048	0.0014	<0.00048	<0.00048	<0.00048	<0.00048	Shoot weight & root weight

*units in lb a.i./A

Seedling Germination

Most sensitive monocot: N/A

Most sensitive dicot: None

Seedling Emergence

Most sensitive monocot: N/A

Most sensitive dicot: Cabbage and Turnip

Most sensitive parameter: Shoot length

NOEC: <0.0010 lb a.i./A (cabbage); 0.0068 lb a.i./A (turnip)

LOEC: 0.0010 lb a.i./A (cabbage); 0.012 (turnip)

EC₂₅: <0.0010 lb a.i./A (cabbage and turnip) 95% CI: N/A

Probit slope: N/A

Vegetative Vigor

Most sensitive monocot: Onion (only monocot)

Most sensitive parameter: None

NOEC: 0.0064 lb a.i./A LOEC: >0.0064 lb a.i./A

EC₂₅: >0.0064 lb a.i./A 95% CI: N/A

Probit slope: N/A

Most sensitive dicot: Cabbage and Lettuce

Most sensitive parameter: Shoot and root weight

NOEC: <0.00021 lb a.i./A LOEC: 0.00021 lb a.i./A

EC₂₅: <0.00021 lb a.i./A 95% CI: N/A

Probit slope: N/A

14. REVIEWER'S COMMENTS:

The reviewer determined that cabbage and turnip were the most sensitive species in the seedling emergence test based on shoot length and cabbage and lettuce were the most sensitive species in the vegetative vigor test based on shoot and root weight. The NOEC values were determined by the reviewer. The NOEC and EC₂₅ were not calculated by the study author.

This study was submitted as supplemental to a seedling emergence and vegetative vigor study with ten plant species (MRID 43573242).

This study was conducted in accordance with USEPA Good Laboratory Practice Standards and includes a Quality Assurance statement.

15. REFERENCES: None cited

APPENDIX I. OUTPUT FROM REVIEWER'S STATISTICAL VERIFICATION:**Tomato germination**

Standard Two-Sample t-Test

data: x: pooled control in DS1 , and y: 0.20 lb a.i./A in DS1

t = 1.8906, df = 7, p-value = 0.1006

alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval:

-6.059194 54.392527

sample estimates:

mean of pooled control = 60.83333

mean of 0.20 lb a.i./A = 36.66667

Tomato radicle elongation

Standard Two-Sample t-Test

data: x: solvent control in DS1 , and y: 0.20 lb a.i./A in DS1

t = 0.2764, df = 4, p-value = 0.7959

alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval:

-5.124858 6.258191

sample estimates:

mean of solvent control = 10.43333

mean of 0.20 lb a.i./A = 9.866667

SEEDLING EMERGENCE**Cabbage emergence**

visually determined NOEC = 0.023 lb a.i./A

Cabbage shoot length

cabbage shoot length

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ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	73.000	12.167	56.329
Within (Error)	16	3.458	0.216	
Total	22	76.458		

Critical F value = 2.74 (0.05,6,16)

Since F > Critical F REJECT Ho:All groups equal

cabbage shoot length

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BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

		TRANSFORMED MEAN CALCULATED IN			
GROUP	IDENTIFICATION	MEAN	ORIGINAL UNITS	T STAT	SIG
1	pooled control	6.033	6.033		
2	0.0010	4.867	4.867	3.550	*
3	0.0020	2.833	2.833	9.737	*
4	0.0038	2.200	2.200	11.664	*
5	0.0068	2.100	2.100	11.969	*
6	0.012	1.933	1.933	12.476	*
7	0.023	1.350	1.350	12.342	*

Bonferroni T table value = 2.67 (1 Tailed Value, P=0.05, df=16,6)

cabbage shoot length

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BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

		NUM OF Minimum Sig Diff % of DIFFERENCE			
GROUP	IDENTIFICATION	REPS	(IN ORIG. UNITS)	CONTROL	FROM CONTROL
1	pooled control	6			
2	0.0010	3	0.879	14.6	1.167
3	0.0020	3	0.879	14.6	3.200
4	0.0038	3	0.879	14.6	3.833
5	0.0068	3	0.879	14.6	3.933
6	0.012	3	0.879	14.6	4.100
7	0.023	2	1.015	16.8	4.683

cabbage shoot length

File: 5403cl Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

		ORIGINAL	TRANSFORMED	ISOTONIZED
GROUP	IDENTIFICATION	N	MEAN	MEAN
1	pooled control	6	6.033	6.033
2	0.0010	3	4.867	4.867
3	0.0020	3	2.833	2.833
4	0.0038	3	2.200	2.200
5	0.0068	3	2.100	2.100
6	0.012	3	1.933	1.933
7	0.023	2	1.350	1.350

cabbage shoot length

File: 5403cl Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

ISOTONIZED CALC. SIG TABLE DEGREES OF

DP Barcode: D282361

MRID No.: 45535403

IDENTIFICATION	MEAN	WILLIAMS P=.05	WILLIAMS	FREEDOM
pooled control	6.033			
0.0010	4.867	3.549	*	1.75 K= 1, V=16
0.0020	2.833	9.734	*	1.83 K= 2, V=16
0.0038	2.200	11.660	*	1.86 K= 3, V=16
0.0068	2.100	11.965	*	1.87 K= 4, V=16
0.012	1.933	12.472	*	1.88 K= 5, V=16
0.023	1.350	12.337	*	1.89 K= 6, V=16

S = 0.465

Note: df used for table values are approximate when v > 20.

Soybean emergence

visually determined NOEC = 0.19 lb a.i./A

Soybean length

soybean shoot length

File: 5403yl Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	2030.419	406.084	36.971
Within (Error)	15	164.767	10.984	
Total	20	2195.186		

Critical F value = 2.90 (0.05,5,15)

Since F > Critical F REJECT Ho:All groups equal

soybean shoot length

File: 5403yl Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	MEAN	TRANSFORMED MEAN CALCULATED IN	ORIGINAL UNITS	T STAT	SIG
1	pooled control	39.933	39.933			
2	0.012	30.500	30.500	4.025 *		
3	0.023	27.767	27.767	5.192 *		
4	0.045	21.767	21.767	7.752 *		
5	0.092	16.700	16.700	9.914 *		
6	0.19	13.000	13.000	11.493 *		

Bonferroni T table value = 2.60 (1 Tailed Value, P=0.05, df=15,5)

soybean shoot length

File: 5403yl Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	REPS	NUM OF	Minimum Sig Diff	% of DIFFERENCE
			(IN ORIG. UNITS)	CONTROL FROM CONTROL	
1	pooled control	6			
2	0.012	3	6.100	15.3	9.433
3	0.023	3	6.100	15.3	12.167
4	0.045	3	6.100	15.3	18.167
5	0.092	3	6.100	15.3	23.233
6	0.19	3	6.100	15.3	26.933

soybean shoot length

File: 5403yl Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	ORIGINAL IDENTIFICATION	N	MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	pooled control	6	39.933	39.933	39.933
2	0.012	3	30.500	30.500	30.500
3	0.023	3	27.767	27.767	27.767
4	0.045	3	21.767	21.767	21.767
5	0.092	3	16.700	16.700	16.700
6	0.19	3	13.000	13.000	13.000

soybean shoot length

File: 5403yl Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. SIG	TABLE WILLIAMS	DEGREES OF P=.05 WILLIAMS	FREEDOM
pooled control	39.933				
0.012	30.500	4.025	*	1.75	K= 1, V=15
0.023	27.767	5.192	*	1.84	K= 2, V=15
0.045	21.767	7.752	*	1.87	K= 3, V=15
0.092	16.700	9.914	*	1.88	K= 4, V=15
0.19	13.000	11.493	*	1.89	K= 5, V=15

S = 3.314

Note: df used for table values are approximate when V > 20.

Turnip emergence

Standard Two-Sample t-Test

data: x: pooled control in DS1 , and y: 0.0038 lb a.i./A in DS1

t = 1.1832, df = 7, p-value = 0.2753

alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval:

-9.984722 29.984722

sample estimates:

DP Barcode: D282361

MRID No.: 45535403

mean of pooled control = 93.33333
mean of 0.0038 lb a.i./A = 83.33333

Standard Two-Sample t-Test

data: x: pooled control in DS1 , and y: 0.0068 lb a.i./A in DS1
 $t = 1.0184$, df = 7, p-value = 0.3424
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
-8.813433 22.146766
sample estimates:
mean of pooled control = 93.33333
mean of 0.0068 lb a.i./A = 86.66667

Turnip shoot length

turnip shoot length

File: 5403tl Transform: NO TRANSFORMATION

KRUSKAL-WALLIS ANOVA BY RANKS - TABLE 1 OF 2

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	RANK SUM
1	pooled control	10.833	10.833	111.000
2	0.0010	6.667	6.667	42.000
3	0.0020	2.767	2.767	23.500
4	0.0038	2.633	2.633	21.500
5	0.0068	2.367	2.367	17.500
6	0.012	2.333	2.333	15.500

Calculated H Value = 16.157 Critical H Value Table = 11.070
Since Calc H > Crit H REJECT Ho:All groups are equal.

turnip shoot length

File: 5403tl Transform: NO TRANSFORMATION

DUNNS MULTIPLE COMPARISON - KRUSKAL-WALLIS - TABLE 2 OF 2

GROUP	TRANSFORMED	ORIGINAL	0		0	0	0	0	0
GROUP	IDENTIFICATION	MEAN	MEAN	6	5	4	3	2	1
6	0.012	2.333	2.333	\					
5	0.0068	2.367	2.367	.	\				
4	0.0038	2.633	2.633	..	\				
3	0.0020	2.767	2.767	...	\				
2	0.0010	6.667	6.667	\				
1	pooled control	10.833	10.833	*	\			

* = significant difference ($p=0.05$) . = no significant difference
Table q value (0.05,6) = 2.936 Unequal reps - multiple SE values

DP Barcode: D282361

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VEGETATIVE VIGOR

Cabbage shoot length

cabbage vigor shoot length

File: 5403cvl Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	28.253	4.709	14.808
Within (Error)	17	5.407	0.318	
Total	23	33.660		

Critical F value = 2.70 (0.05,6,17)

Since F > Critical F REJECT Ho:All groups equal

cabbage vigor shoot length

File: 5403cvl Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

TRANSFORMED		MEAN CALCULATED IN		
GROUP	IDENTIFICATION	MEAN	ORIGINAL UNITS	T STAT SIG
1	pooled control	6.200	6.200	
2	0.00021	5.900	5.900	0.752
3	0.00048	6.133	6.133	0.167
4	0.00086	4.433	4.433	4.431 *
5	0.0018	4.233	4.233	4.932 *
6	0.0035	3.633	3.633	6.437 *
7	0.0064	3.700	3.700	6.270 *

Bonferroni T table value = 2.65 (1 Tailed Value, P=0.05, df=17,6)

cabbage vigor shoot length

File: 5403cvl Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

NUM OF		Minimum Sig Diff	% of	DIFFERENCE
GROUP	IDENTIFICATION	REPS	(IN ORIG. UNITS)	CONTROL FROM CONTROL
1	pooled control	6		
2	0.00021	3	1.059	17.1 0.300
3	0.00048	3	1.059	17.1 0.067
4	0.00086	3	1.059	17.1 1.767
5	0.0018	3	1.059	17.1 1.967

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6	0.0035	3	1.059	17.1	2.567
7	0.0064	3	1.059	17.1	2.500

cabbage vigor shoot length

File: 5403cvl Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP IDENTIFICATION	ORIGINAL N	MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1 pooled control	6	6.200	6.200	6.200
2 0.00021	3	5.900	5.900	6.017
3 0.00048	3	6.133	6.133	6.017
4 0.00086	3	4.433	4.433	4.433
5 0.0018	3	4.233	4.233	4.233
6 0.0035	3	3.633	3.633	3.667
7 0.0064	3	3.700	3.700	3.667

cabbage vigor shoot length

File: 5403cvl Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. SIG	TABLE WILLIAMS	DEGREES OF P=.05	WILLIAMS	FREEDOM
pooled control	6.200					
0.00021	6.017	0.460	1.74	k= 1, v=17		
0.00048	6.017	0.460	1.82	k= 2, v=17		
0.00086	4.433	4.430	*	1.85	k= 3, v=17	
0.0018	4.233	4.932	*	1.87	k= 4, v=17	
0.0035	3.667	6.353	*	1.87	k= 5, v=17	
0.0064	3.667	6.353	*	1.88	k= 6, v=17	

s = 0.564

Note: df used for table values are approximate when v > 20.

Cabbage shoot weight

cabbage vigor weight

File: 5403cw Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.184	0.031	31.000
Within (Error)	17	0.019	0.001	

DP Barcode: D282361

MRID No.: 45535403

Total 23 0.203

Critical F value = 2.70 (0.05,6,17)
Since F > Critical F REJECT Ho:All groups equal

cabbage vigor weight
File: 5403cw Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

		TRANSFORMED MEAN CALCULATED IN				
GROUP	IDENTIFICATION	MEAN	ORIGINAL UNITS	T STAT	SIG	
1	GRPS 1&2 POOLED	0.304	0.304		*	
2	0.00021	0.215	0.215	3.961	*	
3	0.00048	0.188	0.188	5.180	*	
4	0.00086	0.143	0.143	7.194	*	
5	0.0018	0.106	0.106	8.864	*	
6	0.0035	0.076	0.076	10.180	*	
7	0.0064	0.072	0.072	10.396	*	

Bonferroni T table value = 2.65 (1 Tailed Value, P=0.05, df=17,6)

cabbage vigor weight
File: 5403cw Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

		NUM OF	Minimum Sig Diff	% of	DIFFERENCE	
GROUP	IDENTIFICATION	REPS	(IN ORIG. UNITS)	CONTROL	FROM CONTROL	
1	GRPS 1&2 POOLED	6				
2	0.00021	3	0.059	19.5	0.089	
3	0.00048	3	0.059	19.5	0.116	
4	0.00086	3	0.059	19.5	0.161	
5	0.0018	3	0.059	19.5	0.198	
6	0.0035	3	0.059	19.5	0.228	
7	0.0064	3	0.059	19.5	0.232	

cabbage vigor weight
File: 5403cw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	ORIGINAL	TRANSFORMED	ISOTONIZED		
IDENTIFICATION	N	MEAN	MEAN		
1	GRPS 1&2 POOLED	6	0.304	0.304	0.304
2	0.00021	3	0.215	0.215	0.215
3	0.00048	3	0.188	0.188	0.188

DP Barcode: D282361

MRID No.: 45535403

4	0.00086	3	0.143	0.143	0.143
5	0.0018	3	0.106	0.106	0.106
6	0.0035	3	0.076	0.076	0.076
7	0.0064	3	0.072	0.072	0.072

cabbage vigor weight

File: 5403cw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC.	SIG	TABLE WILLIAMS P=.05	DEGREES OF WILLIAMS FREEDOM
<hr/>					
GRPS 1&2 POOLED	0.304				
0.00021	0.215	3.710	*	1.74	k= 1, v=17
0.00048	0.188	4.852	*	1.82	k= 2, v=17
0.00086	0.143	6.738	*	1.85	k= 3, v=17
0.0018	0.106	8.302	*	1.87	k= 4, v=17
0.0035	0.076	9.535	*	1.87	k= 5, v=17
0.0064	0.072	9.737	*	1.88	k= 6, v=17

s = 0.034

Note: df used for table values are approximate when v > 20.

cabbage root weight

cabbage root weight

File: 5403crw Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.149	0.025	5.000
Within (Error)	17	0.086	0.005	
Total	23	0.235		

Critical F value = 2.70 (0.05,6,17)

Since F > Critical F REJECT Ho:All groups equal

cabbage root weight

File: 5403crw Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN CALCULATED IN	MEAN	ORIGINAL UNITS	T STAT	SIG
1	GRPS 1&2 POOLED	0.252	0.252			
2	0.00021	0.157	0.157	1.899		

DP Barcode: D282361

MRID No.: 45535403

3	0.00048	0.115	0.115	2.738 *
4	0.00086	0.192	0.192	1.201
5	0.0018	0.042	0.042	4.187 *
6	0.0035	0.080	0.080	3.437 *
7	0.0064	0.050	0.050	4.028 *

Bonferroni T table value = 2.65 (1 Tailed Value, P=0.05, df=17,6)

cabbage root weight

File: 5403crw Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	REPS	NUM OF	Minimum	Sig Diff	% of	DIFFERENCE
			(IN ORIG. UNITS)	CONTROL	FROM CONTROL	CONTROL	CONTROL
1	GRPS 1&2 POOLED	6					
2	0.00021	3	0.133	52.7	0.095		
3	0.00048	3	0.133	52.7	0.137		
4	0.00086	3	0.133	52.7	0.060		
5	0.0018	3	0.133	52.7	0.209		
6	0.0035	3	0.133	52.7	0.172		
7	0.0064	3	0.133	52.7	0.201		

cabbage root weight

File: 5403crw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL	TRANSFORMED	ISOTONIZED
			MEAN	MEAN	MEAN
1	GRPS 1&2 POOLED	6	0.252	0.252	0.252
2	0.00021	3	0.157	0.157	0.157
3	0.00048	3	0.115	0.115	0.153
4	0.00086	3	0.192	0.192	0.153
5	0.0018	3	0.042	0.042	0.061
6	0.0035	3	0.080	0.080	0.061
7	0.0064	3	0.050	0.050	0.050

cabbage root weight

File: 5403crw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	MEAN	SIG	TABLE	DEGREES OF		
			WILLIAMS	P=.05	WILLIAMS	FREEDOM
GRPS 1&2 POOLED	0.252					
0.00021	0.157	1.887	*	1.74	k= 1, v=17	
0.00048	0.153	1.958	*	1.82	k= 2, v=17	
0.00086	0.153	1.958	*	1.85	k= 3, v=17	

DP Barcode: D282361

MRID No.: 45535403

0.0018	0.061	3.789	*	1.87	k= 4, v=17
0.0035	0.061	3.789	*	1.87	k= 5, v=17
0.0064	0.050	4.004	*	1.88	k= 6, v=17

s = 0.071

Note: df used for table values are approximate when v > 20.

Cucumber shoot length

cucumber shoot length

File: 5403uvl Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	350.226	58.371	19.841
Within (Error)	17	50.013	2.942	
Total	23	400.240		

Critical F value = 2.70 (0.05,6,17)

Since F > Critical F REJECT Ho:All groups equal

cucumber shoot length

File: 5403uvl Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN CALCULATED IN		T STAT	SIG
		MEAN	ORIGINAL UNITS		
1	pooled control	25.900	25.900		
2	0.0064	23.900	23.900	1.649	
3	0.0084	23.167	23.167	2.254	
4	0.019	24.433	24.433	1.209	
5	0.038	21.233	21.233	3.848 *	
6	0.079	16.567	16.567	7.695 *	
7	0.16	15.267	15.267	8.767 *	

Bonferroni T table value = 2.65 (1 Tailed Value, P=0.05, df=17,6)

cucumber shoot length

File: 5403uvl Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF	Minimum Sig Diff	% of	DIFFERENCE
		REPS	(IN ORIG. UNITS)	CONTROL FROM CONTROL	
1	pooled control	6			

DP Barcode: D282361

MRID No.: 45535403

2	0.0064	3	3.220	12.4	2.000
3	0.0084	3	3.220	12.4	2.733
4	0.019	3	3.220	12.4	1.467
5	0.038	3	3.220	12.4	4.667
6	0.079	3	3.220	12.4	9.333
7	0.16	3	3.220	12.4	10.633

cucumber shoot length

File: 5403uvl Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP IDENTIFICATION	ORIGINAL N	TRANSFORMED MEAN	ISOTONIZED MEAN
1 pooled control	6 25.900	25.900	25.900
2 0.0064	3 23.900	23.900	23.900
3 0.0084	3 23.167	23.167	23.800
4 0.019	3 24.433	24.433	23.800
5 0.038	3 21.233	21.233	21.233
6 0.079	3 16.567	16.567	16.567
7 0.16	3 15.267	15.267	15.267

cucumber shoot length

File: 5403uvl Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. SIG	TABLE WILLIAMS	DEGREES OF P=.05	WILLIAMS	FREEDOM
pooled control	25.900					
0.0064	23.900	1.649	1.74	K= 1, v=17		
0.0084	23.800	1.731	1.82	K= 2, v=17		
0.019	23.800	1.731	1.85	K= 3, v=17		
0.038	21.233	3.848	*	K= 4, v=17		
0.079	16.567	7.695	*	K= 5, v=17		
0.16	15.267	8.767	*	K= 6, v=17		

s = 1.715

Note: df used for table values are approximate when v > 20.

Cucumber shoot weight

cucumber shoot weight

File: 5403usw Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.375	0.063	31.500

Within (Error)	17	0.029	0.002
Total	23	0.404	

Critical F value = 2.70 (0.05,6,17)
 Since F > Critical F REJECT Ho:All groups equal

cucumber shoot weight
 File: 5403usw Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN CALCULATED IN			T STAT	SIG
		MEAN	ORIGINAL UNITS			
1	GRPS 1&2 POOLED	0.560	0.560			
2	0.0064	0.402	0.402	5.002 *		
3	0.0084	0.344	0.344	6.828 *		
4	0.019	0.365	0.365	6.181 *		
5	0.038	0.269	0.269	9.207 *		
6	0.079	0.241	0.241	10.093 *		
7	0.16	0.214	0.214	10.937 *		

Bonferroni T table value = 2.65 (1 Tailed Value, P=0.05, df=17,6)

cucumber shoot weight
 File: 5403usw Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	REPS	NUM OF	Minimum Sig Diff	% of	DIFFERENCE	CONTROL FROM CONTROL
			(IN ORIG. UNITS)				
1	GRPS 1&2 POOLED	6					
2	0.0064	3	0.084	15.0	0.158		
3	0.0084	3	0.084	15.0	0.216		
4	0.019	3	0.084	15.0	0.195		
5	0.038	3	0.084	15.0	0.291		
6	0.079	3	0.084	15.0	0.319		
7	0.16	3	0.084	15.0	0.346		

cucumber shoot weight
 File: 5403usw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL	TRANSFORMED	ISOTONIZED
			MEAN	MEAN	MEAN
1	GRPS 1&2 POOLED	6	0.560	0.560	0.560
2	0.0064	3	0.402	0.402	0.402

DP Barcode: D282361

MRID No.: 45535403

3	0.0084	3	0.344	0.344	0.355
4	0.019	3	0.365	0.365	0.355
5	0.038	3	0.269	0.269	0.269
6	0.079	3	0.241	0.241	0.241
7	0.16	3	0.214	0.214	0.214

cucumber shoot weight

File: 5403usw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. SIG	TABLE WILLIAMS	DEGREES OF P=.05	WILLIAMS	DEGREES OF FREEDOM
GRPS 1&2 POOLED	0.560					
0.0064	0.402	5.442	*	1.74	k= 1, v=17	
0.0084	0.355	7.076	*	1.82	k= 2, v=17	
0.019	0.355	7.076	*	1.85	k= 3, v=17	
0.038	0.269	10.016	*	1.87	k= 4, v=17	
0.079	0.241	10.980	*	1.87	k= 5, v=17	
0.16	0.214	11.898	*	1.88	k= 6, v=17	

s = 0.041

Note: df used for table values are approximate when v > 20.

cucumber root weight

cucumber root weight

File: 5403urw Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.586	0.098	14.000
Within (Error)	17	0.121	0.007	
Total	23	0.707		

Critical F value = 2.70 (0.05,6,17)

Since F > Critical F REJECT Ho:All groups equal

cucumber root weight

File: 5403urw Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	GRPS 1&2 POOLED	0.561	0.561		

DP Barcode: D282361

MRID No.: 45535403

2	0.0064	0.322	0.322	4.045 *
3	0.0084	0.259	0.259	5.113 *
4	0.019	0.196	0.196	6.178 *
5	0.038	0.369	0.369	3.247 *
6	0.079	0.151	0.151	6.931 *
7	0.16	0.150	0.150	6.953 *

Bonferroni T table value = 2.65 (1 Tailed Value, P=0.05, df=17,6)

cucumber root weight

File: 5403urw Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	REPS	NUM OF Minimum Sig Diff % of DIFFERENCE	(IN ORIG. UNITS)	CONTROL FROM CONTROL
1	GRPS 1&2 POOLED	6			
2	0.0064	3	0.157	28.0	0.239
3	0.0084	3	0.157	28.0	0.302
4	0.019	3	0.157	28.0	0.365
5	0.038	3	0.157	28.0	0.192
6	0.079	3	0.157	28.0	0.410
7	0.16	3	0.157	28.0	0.411

cucumber root weight

File: 5403urw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	ORIGINAL IDENTIFICATION	N	TRANSFORMED MEAN	ISOTONIZED MEAN
1	GRPS 1&2 POOLED	6	0.561	0.561
2	0.0064	3	0.322	0.322
3	0.0084	3	0.259	0.275
4	0.019	3	0.196	0.275
5	0.038	3	0.369	0.275
6	0.079	3	0.151	0.151
7	0.16	3	0.150	0.150

cucumber root weight

File: 5403urw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. SIG	TABLE WILLIAMS	DEGREES OF P=.05 WILLIAMS	FREEDOM
GRPS 1&2 POOLED	0.561	0.0064	0.322	4.016 *	1.74 k= 1, v=17

DP Barcode: D282361

MRID No.: 45535403

0.0084	0.275	4.812	*	1.82	k= 2, v=17
0.019	0.275	4.812	*	1.85	k= 3, v=17
0.038	0.275	4.812	*	1.87	k= 4, v=17
0.079	0.151	6.882	*	1.87	k= 5, v=17
0.16	0.150	6.904	*	1.88	k= 6, v=17

s = 0.084

Note: df used for table values are approximate when v > 20.

Lettuce shoot length

lettuce shoot length

File: 5403lvs Transform: NO TRANSFORMATION

KRUSKAL-WALLIS ANOVA BY RANKS - TABLE 1 OF 2

GROUP	TRANSFORMED IDENTIFICATION	MEAN	MEAN CALCULATED IN ORIGINAL UNITS	RANK SUM
1	pooled control	18.283	18.283	111.000
2	0.00021	15.700	15.700	42.000
3	0.00048	13.333	13.333	33.000
4	0.00086	8.600	8.600	24.000
5	0.0018	6.900	6.900	14.000
6	0.0035	5.733	5.733	7.000

Calculated H Value = 19.197 Critical H Value Table = 11.070
Since Calc H > Crit H REJECT Ho:All groups are equal.

lettuce shoot length

File: 5403lvs Transform: NO TRANSFORMATION

DUNNS MULTIPLE COMPARISON - KRUSKAL-WALLIS - TABLE 2 OF 2

GROUP	TRANSFORMED IDENTIFICATION	ORIGINAL MEAN	MEAN	0 0 0 0 0 0
6	0.0035	5.733	5.733	\
5	0.0018	6.900	6.900	. \
4	0.00086	8.600	8.600	.. \
3	0.00048	13.333	13.333	... \
2	0.00021	15.700	15.700 \
1	pooled control	18.283	18.283	** ... \

* = significant difference (p=0.05) . = no significant difference
Table q value (0.05,6) = 2.936 Unequal reps - multiple SE values

Lettuce shoot weight

lettuce shoot weight

File: 5403lsw Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	1667.479	333.496	95.667
Within (Error)	15	52.283	3.486	
Total	20	1719.762		

Critical F value = 2.90 (0.05,5,15)

Since F > Critical F REJECT Ho:All groups equal

lettuce shoot weight

File: 5403lsw Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN CALCULATED IN		ORIGINAL UNITS	T STAT	SIG
		MEAN	REPS			
1	pooled control	23.445	23.445			
2	0.00021	7.593	7.593	12.007	*	
3	0.00048	6.053	6.053	13.173	*	
4	0.00086	2.593	2.593	15.794	*	
5	0.0018	2.590	2.590	15.797	*	
6	0.0035	2.007	2.007	16.238	*	

Bonferroni T table value = 2.60 (1 Tailed Value, P=0.05, df=15,5)

lettuce shoot weight

File: 5403lsw Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	REPS	NUM OF	Minimum Sig Diff	% of	DIFFERENCE	CONTROL FROM CONTROL
			(IN ORIG. UNITS)				
1	pooled control	6					
2	0.00021	3	3.437	14.7	15.852		
3	0.00048	3	3.437	14.7	17.392		
4	0.00086	3	3.437	14.7	20.852		
5	0.0018	3	3.437	14.7	20.855		
6	0.0035	3	3.437	14.7	21.438		

lettuce shoot weight

File: 5403lsw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

DP Barcode: D282361

MRID No.: 45535403

GROUP IDENTIFICATION		ORIGINAL	TRANSFORMED	ISOTONIZED
		N	MEAN	MEAN
1	pooled control	6	23.445	23.445
2	0.00021	3	7.593	7.593
3	0.00048	3	6.053	6.053
4	0.00086	3	2.593	2.593
5	0.0018	3	2.590	2.590
6	0.0035	3	2.007	2.007

lettuce shoot weight

File: 5403lsw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC.	SIG	TABLE	DEGREES OF
		WILLIAMS	P=.05	WILLIAMS	FREEDOM
pooled control	23.445				
0.00021	7.593	12.008	*	1.75	K= 1, V=15
0.00048	6.053	13.174	*	1.84	K= 2, V=15
0.00086	2.593	15.795	*	1.87	K= 3, V=15
0.0018	2.590	15.798	*	1.88	K= 4, V=15
0.0035	2.007	16.239	*	1.89	K= 5, V=15

S = 1.867

Note: df used for table values are approximate when v > 20.

lettuce root weight

lettuce root weight

File: 5403lrw Transform: SQUARE ROOT(Y)

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.254	0.051	8.500
Within (Error)	15	0.089	0.006	
Total	20	0.343		

Critical F value = 2.90 (0.05,5,15)

Since F > Critical F REJECT Ho:All groups equal

lettuce root weight

File: 5403lrw Transform: SQUARE ROOT(Y)

BONFERRONI T-TEST - TABLE 1 OF 2

Ho:Control<Treatment

GROUP		TRANSFORMED MEAN CALCULATED IN IDENTIFICATION MEAN ORIGINAL UNITS T STAT SIG			
1	GRPS 1&2 POOLED	0.413	0.176		
2	0.00021	0.274	0.080	2.535	
3	0.00048	0.253	0.074	2.905 *	
4	0.00086	0.134	0.018	5.077 *	
5	0.0018	0.152	0.024	4.752 *	
6	0.0035	0.157	0.026	4.674 *	

Bonferroni T table value = 2.60 (1 Tailed Value, P=0.05, df=15,5)

lettuce root weight

File: 5403lrw Transform: SQUARE ROOT(Y)

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP		NUM OF IDENTIFICATION	Minimum REPS	Sig Diff % of (IN ORIG. UNITS)	DIFFERENCE CONTROL FROM CONTROL
1	GRPS 1&2 POOLED	6			
2	0.00021	3	0.097	55.3	0.096
3	0.00048	3	0.097	55.3	0.102
4	0.00086	3	0.097	55.3	0.158
5	0.0018	3	0.097	55.3	0.152
6	0.0035	3	0.097	55.3	0.150

lettuce root weight

File: 5403lrw Transform: SQUARE ROOT(Y)

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP		ORIGINAL IDENTIFICATION	N	MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	GRPS 1&2 POOLED	6	0.176	0.413	0.413	
2	0.00021	3	0.080	0.274	0.274	
3	0.00048	3	0.074	0.253	0.253	
4	0.00086	3	0.018	0.134	0.148	
5	0.0018	3	0.024	0.152	0.148	
6	0.0035	3	0.026	0.157	0.148	

lettuce root weight

File: 5403lrw Transform: SQUARE ROOT(Y)

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION		ISOTONIZED MEAN	CALC. SIG	TABLE WILLIAMS	DEGREES OF P=.05	WILLIAMS FREEDOM
GRPS 1&2 POOLED	0.413	0.00021	0.274	2.550 *	1.75	K= 1, v=15

DP Barcode: D282361

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0.00048	0.253	2.922	*	1.84	k= 2, v=15
0.00086	0.148	4.863	*	1.87	k= 3, v=15
0.0018	0.148	4.863	*	1.88	k= 4, v=15
0.0035	0.148	4.863	*	1.89	k= 5, v=15

s = 0.077

Note: df used for table values are approximate when v > 20.

Onion shoot length

onion shoot length

File: 5403ovl Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	14.348	2.391	0.714
Within (Error)	17	56.962	3.351	
Total	23	71.310		

Critical F value = 2.70 (0.05,6,17)

Since F < Critical F FAIL TO REJECT Ho:All groups equal

onion shoot length

File: 5403ovl Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN CALCULATED IN		T STAT	SIG
		MEAN	ORIGINAL UNITS		
1	pooled control	18.117	18.117		
2	0.00021	17.567	17.567	0.425	
3	0.00048	19.367	19.367	-0.966	
4	0.00086	19.233	19.233	-0.863	
5	0.0018	17.900	17.900	0.167	
6	0.0035	17.567	17.567	0.425	
7	0.0064	16.967	16.967	0.888	

Bonferroni T table value = 2.65 (1 Tailed Value, P=0.05, df=17,6)

onion shoot length

File: 5403ovl Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF	Minimum Sig Diff	% of	DIFFERENCE
		REPS	(IN ORIG. UNITS)	CONTROL FROM CONTROL	

1	pooled control	6			
2	0.00021	3	3.437	19.0	0.550
3	0.00048	3	3.437	19.0	-1.250
4	0.00086	3	3.437	19.0	-1.117
5	0.0018	3	3.437	19.0	0.217
6	0.0035	3	3.437	19.0	0.550
7	0.0064	3	3.437	19.0	1.150

onion shoot length

File: 5403ovl Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP IDENTIFICATION		ORIGINAL N	TRANSFORMED MEAN	ISOTONIZED MEAN
1	pooled control	6	18.117	18.117
2	0.00021	3	17.567	18.480
3	0.00048	3	19.367	18.480
4	0.00086	3	19.233	18.480
5	0.0018	3	17.900	17.900
6	0.0035	3	17.567	17.567
7	0.0064	3	16.967	16.967

onion shoot length

File: 5403ovl Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. SIG	TABLE WILLIAMS	DEGREES OF P=.05	WILLIAMS	FREEDOM
pooled control	18.480					
0.00021	18.480	0.281	1.74	k= 1, v=17		
0.00048	18.480	0.281	1.82	k= 2, v=17		
0.00086	18.480	0.281	1.85	k= 3, v=17		
0.0018	17.900	0.167	1.87	k= 4, v=17		
0.0035	17.567	0.425	1.87	k= 5, v=17		
0.0064	16.967	0.888	1.88	k= 6, v=17		

s = 1.830

Note: df used for table values are approximate when v > 20.

Onion shoot weight

onion shoot weight

File: 5403osw Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F

DP Barcode: D282361

MRID No.: 45535403

Between	6	1.540	0.257	1.836
Within (Error)	17	2.380	0.140	
Total	23	3.920		

Critical F value = 2.70 (0.05,6,17)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

onion shoot weight

File: 5403osw Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN CALCULATED IN		T STAT	SIG
		MEAN	ORIGINAL UNITS		
1	pooled control	2.452	2.452		
2	0.00021	2.343	2.343	0.409	
3	0.00048	2.823	2.823	-1.405	
4	0.00086	2.400	2.400	0.195	
5	0.0018	1.980	1.980	1.783	
6	0.0035	2.140	2.140	1.178	
7	0.0064	2.053	2.053	1.506	

Bonferroni T table value = 2.65 (1 Tailed Value, P=0.05, df=17,6)

onion shoot weight

File: 5403osw Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	REPS	NUM OF	Minimum Sig Diff	% of	DIFFERENCE
			(IN ORIG. UNITS)	CONTROL FROM CONTROL		
1	pooled control	6				
2	0.00021	3	0.702	28.7	0.108	
3	0.00048	3	0.702	28.7	-0.372	
4	0.00086	3	0.702	28.7	0.052	
5	0.0018	3	0.702	28.7	0.472	
6	0.0035	3	0.702	28.7	0.312	
7	0.0064	3	0.702	28.7	0.398	

onion shoot weight

File: 5403osw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL	TRANSFORMED	ISOTONIZED
			MEAN	MEAN	MEAN

1	pooled control	6	2.452	2.452	2.518
2		0.00021	3	2.343	2.343
3		0.00048	3	2.823	2.823
4		0.00086	3	2.400	2.400
5		0.0018	3	1.980	1.980
6		0.0035	3	2.140	2.140
7		0.0064	3	2.053	2.053

onion shoot weight

File: 5403osw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED CALC.	SIG	TABLE	DEGREES OF	
	MEAN	WILLIAMS	P=.05	WILLIAMS	FREEDOM

pooled control	2.518				
0.00021	2.518	0.249	1.74	k= 1, v=17	
0.00048	2.518	0.249	1.82	k= 2, v=17	
0.00086	2.400	0.195	1.85	k= 3, v=17	
0.0018	2.060	1.480	1.87	k= 4, v=17	
0.0035	2.060	1.480	1.87	k= 5, v=17	
0.0064	2.053	1.505	1.88	k= 6, v=17	

s = 0.374

Note: df used for table values are approximate when v > 20.

Onion root weight

onion root weight

File: 5403orw Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	2.053	0.342	1.315
Within (Error)	17	4.414	0.260	
Total	23	6.466		

Critical F value = 2.70 (0.05,6,17)

Since F < Critical F FAIL TO REJECT Ho:All groups equal

onion root weight

File: 5403orw Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

TRANSFORMED MEAN CALCULATED IN

GROUP	IDENTIFICATION	MEAN	ORIGINAL UNITS	T STAT	SIG
1	GRPS 1&2 POOLED	2.037	2.037		
2	0.00021	1.230	1.230	2.237	
3	0.00048	1.870	1.870	0.462	
4	0.00086	1.503	1.503	1.479	
5	0.0018	1.557	1.557	1.331	
6	0.0035	1.307	1.307	2.025	
7	0.0064	1.530	1.530	1.405	

Bonferroni T table value = 2.65 (1 Tailed Value, P=0.05, df=17,6)

onion root weight

File: 5403orw Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	REPS	NUM OF	Minimum Sig Diff	% of	DIFFERENCE
			(IN ORIG. UNITS)	CONTROL	FROM CONTROL	
1	GRPS 1&2 POOLED	6				
2	0.00021	3	0.957	47.0	0.807	
3	0.00048	3	0.957	47.0	0.167	
4	0.00086	3	0.957	47.0	0.533	
5	0.0018	3	0.957	47.0	0.480	
6	0.0035	3	0.957	47.0	0.730	
7	0.0064	3	0.957	47.0	0.507	

onion root weight

File: 5403orw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	ORIGINAL	TRANSFORMED	ISOTONIZED
IDENTIFICATION	N	MEAN	MEAN
1	GRPS 1&2 POOLED	6	2.037
2	0.00021	3	1.230
3	0.00048	3	1.870
4	0.00086	3	1.503
5	0.0018	3	1.557
6	0.0035	3	1.307
7	0.0064	3	1.530

onion root weight

File: 5403orw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. MEAN	SIG WILLIAMS	TABLE P=.05 WILLIAMS	DEGREES OF FREEDOM

GRPS 1&2 POOLED		2.037		
0.00021	1.550	1.351	1.74	k= 1, v=17
0.00048	1.550	1.351	1.82	k= 2, v=17
0.00086	1.530	1.406	1.85	k= 3, v=17
0.0018	1.530	1.406	1.87	k= 4, v=17
0.0035	1.418	1.716	1.87	k= 5, v=17
0.0064	1.418	1.716	1.88	k= 6, v=17

s = 0.510

Note: df used for table values are approximate when v > 20.

Soybean shoot length

soybean shoot length

File: 5403yvl Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	3850.740	641.790	53.478
Within (Error)	17	204.020	12.001	
Total	23	4054.760		

Critical F value = 2.70 (0.05,6,17)

Since F > Critical F REJECT Ho:All groups equal

soybean shoot length

File: 5403yvl Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN CALCULATED IN			T STAT	SIG
		MEAN	ORIGINAL UNITS			
1	pooled control	81.233	81.233			
2	0.0064	65.433	65.433	6.450 *		
3	0.0084	63.333	63.333	7.307 *		
4	0.019	55.767	55.767	10.396 *		
5	0.038	52.733	52.733	11.635 *		
6	0.079	50.900	50.900	12.383 *		
7	0.16	45.200	45.200	14.710 *		

Bonferroni T table value = 2.65 (1 Tailed Value, P=0.05, df=17,6)

soybean shoot length

File: 5403yvl Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff % of (IN ORIG. UNITS)	DIFFERENCE
-------	----------------	-------------	---	------------

1	pooled control	6		
2	0.0064	3	6.504	8.0 15.800
3	0.0084	3	6.504	8.0 17.900
4	0.019	3	6.504	8.0 25.467
5	0.038	3	6.504	8.0 28.500
6	0.079	3	6.504	8.0 30.333
7	0.16	3	6.504	8.0 36.033

soybean shoot length

File: 5403yvl Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	ORIGINAL N	TRANSFORMED MEAN	ISOTONIZED MEAN
1	pooled control	6	81.233	81.233
2	0.0064	3	65.433	65.433
3	0.0084	3	63.333	63.333
4	0.019	3	55.767	55.767
5	0.038	3	52.733	52.733
6	0.079	3	50.900	50.900
7	0.16	3	45.200	45.200

soybean shoot length

File: 5403yvl Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. SIG WILLIAMS	TABLE P=.05 WILLIAMS	DEGREES OF FREEDOM
pooled control	81.233			
0.0064	65.433	6.450 *	1.74	K= 1, V=17
0.0084	63.333	7.307 *	1.82	K= 2, V=17
0.019	55.767	10.396 *	1.85	K= 3, V=17
0.038	52.733	11.635 *	1.87	K= 4, V=17
0.079	50.900	12.383 *	1.87	K= 5, V=17
0.16	45.200	14.710 *	1.88	K= 6, V=17

S = 3.464

Note: df used for table values are approximate when v > 20.

Soybean shoot weight

soybean shoot weight

File: 5403ysw Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	7919.251	1319.875	30.860
Within (Error)	17	727.084	42.770	
Total	23	8646.335		

Critical F value = 2.70 (0.05,6,17)
 Since F > Critical F REJECT Ho:All groups equal

soybean shoot weight
 File: 5403ysw Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	MEAN	ORIGINAL UNITS	T STAT	SIG
1	pooled control	75.355	75.355		
2	0.0064	42.200	42.200	7.170	*
3	0.0084	43.153	43.153	6.963	*
4	0.019	38.060	38.060	8.065	*
5	0.038	29.400	29.400	9.938	*
6	0.079	30.283	30.283	9.747	*
7	0.16	28.323	28.323	10.170	*

Bonferroni T table value = 2.65 (1 Tailed Value, P=0.05, df=17,6)

soybean shoot weight
 File: 5403ysw Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	REPS	NUM OF	Minimum Sig Diff	% of	DIFFERENCE
				(IN ORIG. UNITS)		CONTROL FROM CONTROL
1	pooled control	6				
2	0.0064	3	12.278	16.3	33.155	
3	0.0084	3	12.278	16.3	32.202	
4	0.019	3	12.278	16.3	37.295	
5	0.038	3	12.278	16.3	45.955	
6	0.079	3	12.278	16.3	45.072	
7	0.16	3	12.278	16.3	47.032	

soybean shoot weight
 File: 5403ysw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP IDENTIFICATION		N	ORIGINAL	TRANSFORMED	ISOTONIZED
			MEAN	MEAN	MEAN
1	pooled control	6	75.355	75.355	75.355
2	0.0064	3	42.200	42.200	42.677
3	0.0084	3	43.153	43.153	42.677
4	0.019	3	38.060	38.060	38.060
5	0.038	3	29.400	29.400	29.842
6	0.079	3	30.283	30.283	29.842
7	0.16	3	28.323	28.323	28.323

soybean shoot weight

File: 5403ysw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED CALC.		SIG	TABLE	DEGREES OF
	MEAN	WILLIAMS	P=.05	WILLIAMS	FREEDOM
pooled control	75.355				
0.0064	42.677	7.067	*	1.74	K= 1, V=17
0.0084	42.677	7.067	*	1.82	K= 2, V=17
0.019	38.060	8.065	*	1.85	K= 3, V=17
0.038	29.842	9.842	*	1.87	K= 4, V=17
0.079	29.842	9.842	*	1.87	K= 5, V=17
0.16	28.323	10.170	*	1.88	K= 6, V=17

s = 6.540

Note: df used for table values are approximate when v > 20.

Soybean root weight**soybean root weight**

File: 5403yrw Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	1367.241	227.874	3.635
Within (Error)	17	1065.692	62.688	
Total	23	2432.933		

Critical F value = 2.70 (0.05,6,17)

Since F > Critical F REJECT Ho:All groups equal

soybean root weight

File: 5403yrw Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN CALCULATED IN			T STAT	SIG
		MEAN	ORIGINAL UNITS			
1	pooled control	44.413	44.413			
2	0.0064	32.733	32.733	2.086		
3	0.0084	34.620	34.620	1.749		
4	0.019	27.667	27.667	2.991 *		
5	0.038	25.537	25.537	3.372 *		
6	0.079	24.913	24.913	3.483 *		
7	0.16	26.337	26.337	3.229 *		

Bonferroni T table value = 2.65 (1 Tailed Value, P=0.05, df=17,6)

soybean root weight

File: 5403yrw Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	REPS	NUM OF	Minimum Sig Diff	% of	DIFFERENCE
			(IN ORIG. UNITS)	CONTROL	FROM CONTROL	
1	pooled control	6				
2	0.0064	3	14.864	33.5	11.680	
3	0.0084	3	14.864	33.5	9.793	
4	0.019	3	14.864	33.5	16.747	
5	0.038	3	14.864	33.5	18.877	
6	0.079	3	14.864	33.5	19.500	
7	0.16	3	14.864	33.5	18.077	

soybean root weight

File: 5403yrw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL	TRANSFORMED	ISOTONIZED
			MEAN	MEAN	MEAN
1	pooled control	6	44.413	44.413	44.413
2	0.0064	3	32.733	32.733	33.677
3	0.0084	3	34.620	34.620	33.677
4	0.019	3	27.667	27.667	27.667
5	0.038	3	25.537	25.537	25.596
6	0.079	3	24.913	24.913	25.596
7	0.16	3	26.337	26.337	25.596

soybean root weight

File: 5403yrw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

ISOTONIZED CALC. SIG TABLE DEGREES OF
IDENTIFICATION MEAN WILLIAMS P=.05 WILLIAMS FREEDOM

pooled control	44.413				
0.0064	33.677	1.918	*	1.74	k= 1, v=17
0.0084	33.677	1.918	*	1.82	k= 2, v=17
0.019	27.667	2.991	*	1.85	k= 3, v=17
0.038	25.596	3.361	*	1.87	k= 4, v=17
0.079	25.596	3.361	*	1.87	k= 5, v=17
0.16	25.596	3.361	*	1.88	k= 6, v=17

s = 7.918

Note: df used for table values are approximate when v > 20.

Turnip shoot length

turnip shoot length

File: 5403tv1 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	342.063	85.516	47.404
Within (Error)	13	23.448	1.804	
Total	17	365.511		

Critical F value = 3.18 (0.05,4,13)

Since F > Critical F REJECT Ho:All groups equal

turnip shoot length

File: 5403tv1 Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	MEAN	ORIGINAL UNITS	T STAT	SIG
1	pooled control	18.317	18.317		
2	0.00048	15.833	15.833	2.615 *	
3	0.0014	15.033	15.033	3.457 *	
4	0.0048	8.633	8.633	10.196 *	
5	0.012	7.400	7.400	11.494 *	

Bonferroni T table value = 2.53 (1 Tailed Value, P=0.05, df=13,4)

turnip shoot length

DP Barcode: D282361

MRID No.: 45535403

File: 5403tv1 Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1 pooled control	6			
2 0.00048	3	2.406	13.1	2.483
3 0.0014	3	2.406	13.1	3.283
4 0.0048	3	2.406	13.1	9.683
5 0.012	3	2.406	13.1	10.917

turnip shoot length

File: 5403tv1 Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP IDENTIFICATION	ORIGINAL N	TRANSFORMED MEAN	ISOTONIZED MEAN
1 pooled control	6	18.317	18.317
2 0.00048	3	15.833	15.833
3 0.0014	3	15.033	15.033
4 0.0048	3	8.633	8.633
5 0.012	3	7.400	7.400

turnip shoot length

File: 5403tv1 Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. SIG WILLIAMS	TABLE P=.05 WILLIAMS	DEGREES OF FREEDOM
pooled control	18.317			
0.00048	15.833	2.615 *	1.77	k= 1, v=13
0.0014	15.033	3.457 *	1.86	k= 2, v=13
0.0048	8.633	10.197 *	1.89	k= 3, v=13
0.012	7.400	11.495 *	1.90	k= 4, v=13

s = 1.343

Note: df used for table values are approximate when v > 20.

Turnip shoot weight

turnip shoot weight

File: 5403tsw Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE DF SS MS F

DP Barcode: D282361

MRID No.: 45535403

Between	4	2973.141	743.285	32.597
Within (Error)	13	296.422	22.802	
Total	17	3269.563		

Critical F value = 3.18 (0.05,4,13)

Since F > Critical F REJECT Ho:All groups equal

turnip shoot weight

File: 5403tsw Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP IDENTIFICATION		TRANSFORMED MEAN CALCULATED IN ORIGINAL UNITS			
		MEAN	T STAT	SIG	
1	pooled control	35.227	35.227		
2	0.00048	25.133	25.133	2.989 *	
3	0.0014	14.467	14.467	6.148 *	
4	0.0048	5.533	5.533	8.794 *	
5	0.012	3.840	3.840	9.296 *	

Bonferroni T table value = 2.53 (1 Tailed Value, P=0.05, df=13,4)

turnip shoot weight

File: 5403tsw Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP IDENTIFICATION		NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of DIFFERENCE	DIFFERENCE
			CONTROL	FROM CONTROL	
1	pooled control	6			
2	0.00048	3	8.553	24.3	10.093
3	0.0014	3	8.553	24.3	20.760
4	0.0048	3	8.553	24.3	29.693
5	0.012	3	8.553	24.3	31.387

turnip shoot weight

File: 5403tsw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP IDENTIFICATION		ORIGINAL N	TRANSFORMED MEAN	ISOTONIZED MEAN
1	pooled control	6	35.227	35.227
2	0.00048	3	25.133	25.133
3	0.0014	3	14.467	14.467
4	0.0048	3	5.533	5.533

5	0.012	3	3.840	3.840	3.840
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turnip shoot weight
File: 5403tsw Transform: NO TRANSFORMATION

WILLIAMS TEST (isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED	CALC.	SIG	TABLE	DEGREES OF
	MEAN	WILLIAMS	P=.05	WILLIAMS	FREEDOM
pooled control	35.227				
0.00048	25.133	2.989	*	1.77	k= 1, v=13
0.0014	14.467	6.148	*	1.86	k= 2, v=13
0.0048	5.533	8.794	*	1.89	k= 3, v=13
0.012	3.840	9.296	*	1.90	k= 4, v=13

s = 4.775

Note: df used for table values are approximate when v > 20.

Turnip root weight

turnip root weight

File: 5403trw Transform: SQUARE ROOT(Y)

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	104.921	26.230	9.633
Within (Error)	13	35.396	2.723	
Total	17	140.317		

Critical F value = 3.18 (0.05,4,13)

Since F > Critical F REJECT Ho:All groups equal

turnip root weight

File: 5403trw Transform: SQUARE ROOT(Y)

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	TRANSFORMED MEAN CALCULATED IN			
	IDENTIFICATION	MEAN	ORIGINAL UNITS	T STAT SIG
1	GRPS 1&2 POOLED	7.233	57.600	
2	0.00048	5.104	26.293	1.824
3	0.0014	4.470	20.613	2.367
4	0.0048	1.776	3.383	4.677 *
5	0.012	0.999	1.127	5.342 *

DP Barcode: D282361

MRID No.: 45535403

Bonferroni T table value = 2.53 (1 Tailed Value, P=0.05, df=13,4)

turnip root weight
File: 5403trw Transform: SQUARE ROOT(Y)

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% OF DIFFERENCE CONTROL FROM CONTROL
1 GRPS 1&2 POOLED	6		
2 0.00048	3	34.019	59.1 31.307
3 0.0014	3	34.019	59.1 36.987
4 0.0048	3	34.019	59.1 54.217
5 0.012	3	34.019	59.1 56.473

turnip root weight
File: 5403trw Transform: SQUARE ROOT(Y)

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP IDENTIFICATION	ORIGINAL N	TRANSFORMED MEAN	ISOTONIZED MEAN
1 GRPS 1&2 POOLED	6	57.600	7.233 7.233
2 0.00048	3	26.293	5.104 5.104
3 0.0014	3	20.613	4.470 4.470
4 0.0048	3	3.383	1.776 1.776
5 0.012	3	1.127	0.999 0.999

turnip root weight
File: 5403trw Transform: SQUARE ROOT(Y)

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG. WILLIAMS	TABLE P=.05	DEGREES OF WILLIAMS	FREEDOM
GRPS 1&2 POOLED	7.233					
0.00048	5.104	1.824	*	1.77	K= 1, V=13	
0.0014	4.470	2.368	*	1.86	K= 2, V=13	
0.0048	1.776	4.677	*	1.89	K= 3, V=13	
0.012	0.999	5.342	*	1.90	K= 4, V=13	

s = 1.650

Note: df used for table values are approximate when v > 20.

DP Barcode: D282361

MRID No.: 45535403